

REMARKS/ARGUMENTS

In the Office action dated November 23, 2005, claims 1-24 were rejected. In response, claims 1, 4-6, 11, 16, 17, and 19 have been amended to more clearly recite the limitations of the claims, and claims 25 and 26 have been added. Applicant hereby requests reconsideration of the application in view of the amended claims, the added claims, and the below-provided remarks.

I. Claim Rejections under 35 U.S.C. 102

Claims 1-5, 6-8, and 10 were rejected under 35 U.S.C. 102(b) as being unpatentable over Muterspaugh (U.S. Pat. No. 5,157,786, hereinafter Atkinson). Specifically, the Office action states:

Muterspaugh discloses a biasing network for a balanced mixer, wherein said mixer includes either one or two pairs of switching type diodes, said biasing network resulting in the voltage across the mixer diodes being slightly lower than the threshold voltage for conduction, and the mixer accepts an input from a local oscillator (LO) and also a signal, labeled RF, and outputs a signal labeled IF (Abstract, Column 2 Lines 12-26, Column 5 Lines 35-40, Column 9 Lines 6-10, figs. 1-3). Since mixers can be used to up-convert signals as well as to down-convert signals, these labels are arbitrary, and the input, RF, may be of lower frequency than the output, IF, if the mixer is used to up-convert and input RF signal; one could adopt the convention that RF is of higher frequency than IF, in which case the labels would be reversed when the mixer of Muterspaugh's is used as an up-converter. The use of DC biasing with the mixer diodes results in improved mixer performance (Abstract, Column 6 Lines 28-41), and also allows for an I/O amplitude less than the diode turn on voltage of 0.3 Volts (Abstract, Column 6 Lines 63-68, Column 7 Lines 64-66, Fig. 4). The sum of the DC bias voltage and the LO drive periodically turns on the mixer diodes (Column 5 Lines 19-31). (Emphasis added).

Claim 1

Claim 1 recites "means for controlling the excitation of the parasitic voltage-dependent capacitance of said at least one mixer diode to produce a reciprocal conversion response between said down-conversion and said up-conversion" (emphasis added).

The Office action does not identify any disclosure of Muterspaugh as anticipating the "reciprocal conversion response" that is recited in claim 1. As recited

in claim 1, the means for controlling the excitation of the parasitic voltage-dependent capacitance produces "a reciprocal conversion response" between the down-conversion and the up-conversion. In contrast, Muterspaugh is silent as to the conversion response of the mixing diodes (24) and (26). Muterspaugh merely discloses a biasing network (40) that biases the diodes (24) and (26) to more reliably cause the diodes to switch between non-conducting and conducting states. (Muterspaugh, col. 5, lines 35-41.) However, Muterspaugh does not even mention reciprocal conversion responses, which affect the characterization of a device under test (DUT) in a three-pair measurement system. Thus, although Muterspaugh discloses a biasing network (40) to bias the mixing diodes (24) and (26), Muterspaugh does not disclose producing any effect on the conversion response of the diodes (24) and (26). In particular, Muterspaugh does not disclose producing a reciprocal conversion response for either of the mixing diodes (24) or (26). Because Muterspaugh does not disclose producing "a reciprocal conversion response" as recited in claim 1, Applicant respectfully asserts claim 1 is not anticipated by Muterspaugh.

Additionally, claim 1 recites "each of said at least one source of DC bias corresponding to one of each of said at least one mixer diode." That is, each mixer diode has a corresponding DC bias source. Support for this amendment is found in FIGS. 9-11 and 13 of the specification of the present application. In contrast, Muterspaugh merely discloses a single biasing network (40) that biases multiple diodes. Specifically, Muterspaugh discloses a single biasing network for a pair of mixer diodes in the singly balanced mixer. (Muterspaugh, Figs. 1 and 3.) Similarly, Muterspaugh discloses only two biasing networks for the four mixer diodes in the doubly balanced mixer (Muterspaugh, Fig. 2.) Muterspaugh does not disclose any embodiments in which a biasing network corresponds to a single mixer diode. In other words, Muterspaugh does not disclose a mixer having a biasing network for each mixer diode. Because Muterspaugh does not disclose "each of said at least one source of DC bias corresponding to one of each of said at least one mixer diode" as recited in claim 1, Applicant respectfully asserts claim 1 is not anticipated by Muterspaugh.

Claim 6

Applicant respectfully asserts independent claim 6 is not anticipated by Muterspaugh for similar reasons to those stated above in regard to independent claim 1. In particular, claim 6 recites a method including "controlling the excitation of the parasitic voltage-dependent capacitance of said at least one mixer diode during said down-conversion and said up-conversion to make said down-conversion response reciprocal to said up-conversion response" (emphasis added). Claim 6 also recites "a DC source at each of said at least one mixer diode."

Here, although the language of claim 6 differs from the language of claim 1 and the scope of claim 6 should be interpreted independently of claim 1, Applicant respectfully asserts that the remarks provided above in regard to claim 1 apply also to claim 6. Thus, because Muterspaugh does not disclose a down-conversion response reciprocal to an up-conversion response, Applicant respectfully asserts claim 6 is not anticipated by Muterspaugh. Additionally, because Muterspaugh does not disclose a DC source at each mixer diode as recited in claim 6, Applicant respectfully asserts claim 6 is not anticipated by Muterspaugh.

Claims 2-5 and 7-10

Claims 2-5 are dependent on claim 1, and claims 7-10 are dependent on claim 6. Applicant asserts claims 2-5 and 7-10 are allowable at least based on allowable base claims.

Claim 5

Claim 5 recites second, third, and fourth mixer diodes and "means for controlling the excitation of the parasitic voltage-dependent capacitance of said second, third, and fourth mixer diodes to produce a reciprocal conversion response between said down-conversion and said up-conversion" (emphasis added). Claim 5 also recites "second, third, and fourth direct current (DC) bias sources." Support for this amendment is found in FIGS. 11 and 13 of the specification of the present application. Claim 5 is dependent on claim 1. Thus, because Muterspaugh does not disclose a reciprocal conversion response, as explained above, Applicant respectfully asserts claim 5 is not anticipated by Muterspaugh. Further, because Muterspaugh does not disclose more than two biasing networks, Applicant respectfully asserts claim 5 is not anticipated by Muterspaugh.

II. Claim Rejections under 35 U.S.C. 103

Claims 9 and 11-24 were rejected under 35 U.S.C. 103(a) as being unpatentable over Muterspaugh in view of Clark et al. (U.S. Pat. No. 6,041,077, hereinafter Clark).

Claim 11

Claim 11 recites "each of said at least one source of DC bias corresponding to one of each of said at least one mixer diode." Applicant respectfully asserts that the remarks provided above in regard to claim 1 apply also to claim 11. Thus, because Muterspaugh does not disclose a source of DC bias at each mixer diode as recited in claim 11, Applicant respectfully asserts the limitations of claim 11 are not taught or suggested by Muterspaugh.

Clark does not cure this lack of teaching by Muterspaugh. As stated above, claim 11 recites "each of said at least one source of DC bias corresponding to one of each of said at least one mixer diode." That is, each mixer diode has a corresponding DC bias source. In contrast, Clark teaches an FTD transmission response method using attenuators (18), (22), (40), and (42) to reduce reflections so that at least one of TM1, TM2, or DUT has a reciprocal frequency transmission response. (Clark, col. 6, lines 34-45.) However, attenuators (18), (22), (40), and (42) are not sources of DC bias. Instead, attenuators (18) and (22) attenuate the signal between the up FTD (14) and the down FTD (16); attenuator (40) attenuates the signal between the up FTD (14) and the VNA (10); and attenuator (42) attenuates the signal between the down FTD (16) and the VNA (10). (Clark, Figs. 1 and 3.) Further, for the sake of argument, even if the attenuators (18), (22), (40), and (42) were considered sources of DC bias, the attenuators (18), (22), (40), and (42) are not connected to individual mixer diodes. Therefore, Clark does not teach or suggest sources of DC bias, generally, or a source of DC bias at each mixer diode. Because Clark does not disclose a source of DC bias at each mixer diode, Applicant respectfully asserts the limitations of claim 11 are not taught or suggested by Clark.

In order to establish a *prima facie* case of obviousness, all the claim limitations must be taught or suggested in the prior art. Here, the combination of Muterspaugh and Clark does not teach or suggest all of the claim limitations. In particular, Muterspaugh and Clark do not teach or suggest the limitation "each of said at least one source of DC bias corresponding to one of each of said at least one mixer

diode.” Because the combination of Muterspaugh and Clark does not teach or suggest a source of DC bias at each mixer diode, Applicant respectfully asserts claim 11 is patentable over Muterspaugh in view of Clark.

Claim 19

Applicant respectfully asserts independent claim 19 is patentable over Muterspaugh in view of Clark for similar reasons to those stated above in regard to independent claim 11. In particular, claim 19 recites a method including “said reciprocal FTD including at least one mixer diode and at least one source of direct current (DC) bias, each of said at least one source of DC bias corresponding to one of each of said at least one mixer diode” (emphasis added).

Here, although the language of claim 19 differs from the language of claim 11 and the scope of claim 19 should be interpreted independently of claim 11, Applicant respectfully asserts that the remarks provided above in regard to claim 11 apply also to claim 19. Thus, because the combination of Muterspaugh and Clark does not teach or suggest a source of DC bias at each mixer diode, Applicant respectfully asserts claim 19 is patentable over Muterspaugh in view of Clark.

Claims 12-18 and 20-24

Claims 12-18 are dependent on claim 11, and claims 20-24 are dependent on claim 19. Applicant asserts claims 12-18 and 20-24 are allowable based on allowable base claims.

Claim 17

Claim 17 recites second, third, and fourth mixer diodes and “second, third, and fourth direct current (DC) bias sources.” Claim 17 is dependent on claim 11. Thus, because the combination of Muterspaugh in view of Clark does not disclose more than two biasing networks, Applicant respectfully asserts claim 17 is patentable over Muterspaugh in view of Clark.

III. New Claims 25 and 26

New claims 25 and 26 recite “a capacitor and an inductor” in combination with the at least one mixer diode. Claim 25 is dependent on claim 1 and claim 26 is dependent on claim 11. Applicant respectfully asserts claims 25 and 26 are not

anticipated by Muterspaugh or Clark because neither Muterspaugh nor Clark, nor the combination of Muterspaugh and Clark, discloses a capacitor and an inductor as recited in claims 25 and 26.

CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the amended claims, the new claims, and the remarks made herein. A notice of allowance is earnestly solicited.

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Respectfully submitted,



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